NAI History

1995


France Cordova. *Image Credit: CCST*

NASA Headquarters Chief Scientist France Cordova writes a Red Team "white paper" in early March characterizing Ames Research Center as having "per capita one of the very strongest intellectual work forces among NASA Centers." This document recommends that Ames should play a key role in "planetary biology" and work on establishing a science institute.


Wesley Huntress. *Image Credit: The Planetary Society*

Also in March, Wesley Huntress (Associate Administrator for Space Science at NASA Headquarters) suggests the term "astrobiology" for NASA use during a meeting focused on exploring ways to increase the role of biological science in space exploration. This is not the first use of the "astrobiology" term, which appears in science writings as early as the 1950s. However, the March meeting is the beginning of NASA's use of this term.

The NASA Headquarters Zero-Based Review Team visits Ames Research Center in mid-March to discuss changes in its research programs and operations.

Ames Research Center considers its "Life in the Universe" ideas to coordinate particular disciplines for studies relating to biology and space. These ideas include: 1) origin, evolution, and distribution of life in the universe; 2) relationship of gravity and life; 3) evolution, evaluation, and protection of living planets; and 4) expansion of life from Earth into space. Follow-up communications between the NASA Headquarters Zero-Based Review Team and Ames Research Center through April help develop a mission in astrobiology at Ames.

NASA Administrator Daniel Goldin gives a press conference at Ames on May 19. He officially names Ames as NASA's Lead Center in Astrobiology and asks Ames to continue exploring collaboration ideas for an Astrobiology Institute.

TOP

1996


The Galileo Orbiter. *Image Credit: Yokohama Science Center*

Several exciting scientific announcements in 1996 fuel a growing interest in astrobiology. In August, the Galileo orbiter sends back images of Europa that suggest the possibility of liquid water under its cracked, icy crust. Later in the year, a Mars meteorite recovered from Antarctica is found to contain possible microscopic fossils of primitive, bacteria-like organisms. This discovery prompts the White House to hold a 'space conference' led by Vice President Al Gore to discuss its implications. Throughout the year, several new extrasolar planets are also identified.

During September 9-11, the first Astrobiology Workshop is held at Ames Research Center. The workshop begins to define the ways in which astrobiology will shape the future of space science.

TOP

1997


Michael Meyer. *Image Credit: NASA*

Appointed to initiate collaborative astrobiology operations, Larry Caroff relocates from NASA Headquarters to Ames Research Center in March. Wesley Huntress (Associate Administrator for Space Science) and Michael Meyer (Discipline Scientist for Astrobiology) serve as NASA Headquarters interaction contacts for astrobiology and Institute development. Special Assistant for Astrobiology, Gerald Soffen, is also appointed at NASA Headquarters.

Various models for astrobiology and related multidisciplinary research (including Astrobiology Institute operations) are explored during Ames Research Center and NASA Headquarters meetings from March through May.

In July, Ames Research Center is formally assigned responsibility for the NASA Astrobiology Institute (NAI) by NASA Headquarters. The NAI reports to Henry McDonald, Director of Ames Research Center.

Also in July, the Ames Research Center astrobiology website is launched as a portal for NASA astrobiology. It provides information on astrobiology-related research, white papers, and workshops. The website makes reference to the development of NAI as well as the Astrobiology Academy, which holds its first session during the summer of 1997.

In October, a Cooperative Agreement Notice (or CAN Cycle-1 for NAI) is issued to initiate proposals for competitive, peer-reviewed selection of research groups for NAI funding. Fifty-two proposals are submitted.

To further the potential for cooperative research, Associate or Affiliate NAI partnerships for international organizations in astrobiology are made possible and defined.

TOP

1998

Information and networking technology needs become a focus of the new 'virtual' institute. In February, a technical plan outlines equipment needed to facilitate interactive communication between physically-dispersed science researchers on the Institute teams. These include videoconferencing, CSCW (computer-supported cooperative work), and WYSWIS (what you see is what I see).

NAI Team research grant selections are announced in May. Program operations for the NASA Astrobiology Institute formally begin in July with a five-year funding period for the eleven selected NAI Lead Teams. These new NAI Lead teams are listed below, each with its Team Principal Investigator (PI) and proposal title.

Arizona State University
Team PI: John Cronin, then Jack Farmer
Proposal Title = Exploring the Living Universe: Origin, Evolution, and Distribution of Life in the Solar System

Carnegie Institution of Washington
Team PI: Sean Solomon
Proposal Title = Hydrothermal Systems: Physical, Chemical, and Biological Evolution and Cosmic Environments

Harvard University
Team PI: Andrew Knoll
Proposal Title = The Planetary Context of Biological Evolution

Jet Propulsion Laboratory
Team PI: Kenneth Nealson
Proposal Title = Coevolution of Planets and Biospheres: Lessons from Earth and Mars

Marine Biological Laboratory (Woods Hole)
Team PI: Mitchel Sogin
Proposal Title = Environmental Genomes and the Evolution of Complex Systems in Simple Organisms

NASA Ames Research Center
Team PI: David Des Marais
Proposal Title = Context for Life, Origin and Early Evolution of Life, The Future of Life (with component projects named for each section)

NASA Johnson Space Center
Team PI: David McKay
Proposal Title = Institute for the Study of Biomarkers (Mineral, Isotopic, Chemical, and Morphologic Biomarkers)

Pennsylvania State University
Team PI: Hiroshi Ohmoto
Proposal Title = The Penn State Astrobiology Research Center (with four identified research area components)

Scripps Research Institute
Team PI: Reza Ghadiri
Proposal = Self-Producing Molecular Systems and Darwinian Chemistry

University of California at Los Angeles
Team PI: Bruce Runnegar
Proposal = Astrobiology at UCLA: An Integrated Multidisciplinary Approach to Research and Education (with five

identified research area components)

University of Colorado at Boulder
Team PI: Bruce Jakosky
Proposal = University of Colorado Center for Astrobiology (with nine identified research area components)

In July, a workshop to develop the NASA Astrobiology Roadmap [December 1998] is held at Ames Research Center. Participants in the workshop develop a list of ten science goals, seventeen more specific objectives, and four principles that are integral to astrobiology program operations. The Astrobiology Roadmap, prepared by David Morrison at Ames and Michael Meyer at Headquarters, is officially adopted by NASA Headquarters in December of 1998.

Scott Hubbard takes the helm as the NAI Interim Manager in August. The following month, Wesley Huntress retires from NASA Headquarters, relocating to the Carnegie Institution of Washington for science research. Edward Weiler is appointed to succeed him as the Associate Administrator for Space Science at NASA Headquarters.

In November, the first NAI General Meeting is held at Ames Research Center. NAI Lead Teams discuss scientific research, plans for education and public outreach, plus information technology for NAI as a virtual institute. The NAI official website is launched in November.

The NAI Implementation Plan (for management and operations) is distributed to NAI Lead Teams in December.

TOP

1999

In May, Nobel prize-winning biologist Baruch S. Blumberg is named as the first NAI Director. He received the Nobel Prize in 1976 for his work in creating a vaccine for Hepatitis B. In mid-September, Baruch (Barry) Blumberg relocates from Fox Chase Cancer Center in Philadelphia to NASA Ames Research Center.


Baruch S. Blumberg. *Image Credit: Kirsch Foundation*

NASA Administrator Daniel Goldin visits Ames Research Center and presides over the appointment of NAI Director Baruch Blumberg with an inspiring speech on astrobiology and NASA's future in space, all with live television broadcast and strong media interest. Goldin's enthusiastic comments include this: "Quite possibly, the rewards from this pursuit of astrobiology may eclipse the societal and economic benefits of all prior NASA activity."

Education and public outreach programs for NAI develop astrobiology exhibits, teaching materials, and presentations for conferences.

The Centro de Astrobiologia (CAB) in Spain becomes an Acting Associate International Partner of NAI.

During this year, a video conferencing system tool set is deployed with training for the 11 Lead Team institutional sites. Access to the PostDoc system is also arranged for NAI members. The PostDoc website had been developed by NASA Ames Research Center as an information repository and communication exchange tool.

At NASA Ames Research Center, a workshop entitled "Symposium to Highlight Societal Implications of Astrobiology" is held on 16-17 November and structured around the basic questions of life and astrobiology. Also at Ames, a mini-symposium entitled "Computational Astrobiology for the 21st Century" is held on 18 November to inaugurate the NASA Center for Computational Astrobiology. These events are examples of NASA Ames Research Center activities as the NASA Lead Center for Astrobiology.

Late in the year, the NAI Annual Report, Year 1 (July 1, 1998 through June 30, 1999) is published. The report summarizes the accomplishments for the first year by each of the NAI teams and identifies plans for the following year. Relationships between NAI annual research project reports and astrobiology objectives outlined in the 1998 Astrobiology Roadmap are indicated to demonstrate consistency between research and NASA objectives. The number of projects for each NAI Team for each Roadmap objective are charted. Publications relating to the NAI team projects are listed. Education and public outreach activities are also reported. Content described above will be continued as a general foundation for NAI Annual Reports.

Three NAI Focus Groups are established by the end of this year: Mars; Microbial Ecogenomics (later EcoGenomics); and Mission to Early Earth. These groups are cross-team research or planning efforts formed around a specific topic of particular significance for advancing astrobiology. They are established via proposals approved by NAI.

TOP

2000

In April, NAI members participate in the First Astrobiology Science Conference, held at NASA Ames Research Center. This conference is for anyone interested in astrobiology. It will likely alternate with the NAI General Meeting, now planned to be held every two years specifically for NAI members.

During May, the NIMS (NAI Information Management System) is launched at NAI Central. This relational, searchable database is used as a repository for NAI Annual Report data. It is accessed to generate reports for presentations concerning NAI members, research projects, publications, etc.

NAI continues to grow by chartering two additional Focus Groups: Evolutionary Genomics in April (later EvoGenomics) and Europa in September.

In June, the CAN 2 (Cooperative Agreement Notice Cycle-2) is issued to initiate proposals for competitive, peer-reviewed selection of research groups for NAI funding. It provides the opportunity for additional NAI Lead Teams, and twenty-eight proposals are received. The proposals are reviewed in October, with decisions announced in 2001.

The Postdoctoral Fellow funding program (NAI/National Research Council) begins with one-year research awards given to six recipients in September. The Fellows work with NAI Teams on astrobiology projects. Their funding can be renewed for a maximum of two years.

Tools and the approach for NAI team collaboration are reassessed to include both human and technical dimensions of interaction. This includes hiring a social scientist as NAI Collaborative Research Manager, who works with information technology staff to improve Lead Team contacts and interaction.

Education and public outreach programs continue to develop astrobiology exhibits and presentations for conferences, plus NAI website resources. These items are grouped in sections identified as "For Teachers" and "For Students" on the NAI website.

On October 16, NAI Director Baruch Blumberg is appointed as Senior NASA Advisor to provide guidance for NASA's newly created enterprise, the Office of Biological and Physical Research with its efforts to develop an interdisciplinary research program focused on biology, to bring together physics, chemistry, biology, and engineering. Blumberg also will continue in his role as director of the Astrobiology Institute.

The NASA Headquarters Astrobiology Task Force, appointed the previous spring as a fact-finding team reporting to the Space Science Advisory Committee, holds a meeting at Ames Research Center on October 30-31. The Task Force is chaired by Charles Beichman of the Jet Propulsion Laboratory Origins Program Office. Its charter is to examine the overall astrobiology program, the specific astrobiology program at NASA Ames Research Center, the proposed NASA Astrobiology Research Lab, and the NAI. Beichman suggests that, in reviewing the NAI, his Task Force could serve the purpose of a "visiting committee" representing NASA Headquarters and the astrobiology science community. He is looking for "stable and effective operating practices, a clear set of short and long term goals, and a sense of community" within the NAI.

Also in October, these two NAI international partners are announced: Centro de Astrobiologia (as an Associate) and the United Kingdom Astrobiology Forum (as an Affiliate). [Note: The UK Astrobiology Forum is replaced in 2003 by: Astrobiology Society of Britain.]

The NAI Annual Report for Year 2 (July 1999 through June 2000) is published in December. Relationships between NAI annual project reports and astrobiology objectives outlined in the 1998 Astrobiology Roadmap are indicated to demonstrate consistency between research and NASA objectives. This will be a continuing activity. Education and public outreach activities are reported annually.

TOP

2001

The year begins with selection of the Australian Centre for Astrobiology as a new International Affiliate Partner in January. In the same month, Carl Pilcher is named Special Assistant for Astrobiology at NASA Headquarters.

A series of steps begins in February with COEL (Committee on the Origins and Evolution of Life) activities, which will eventually lead to a report to the Space Studies Board and the Board on Life Sciences (both of the National Research Council of the National Academies of Science). This is in response to the NASA Authorization Act of 2000 and a request from Edward Weiler (NASA's Associate Administrator for Office of Space Science). COEL is asked to assess the state of the NASA astrobiology program and provide a report by mid-2002. The study is initiated when the COEL group meets to outline the report and hear comments from NAI principal investigators and NASA officials, with follow up sessions in July and November this year.

New NAI Lead Team selections (from the Cooperative Agreement Notice Cycle-2 process) are announced in March. These four additional new NAI Lead teams are listed below, each with its Team Principal Investigator (PI) and proposal title. These additional teams have a five-year funding period. They add to the original 11 NAI Lead Teams (with their five-year funding begun in July 1998) to make a total of 15 Lead Teams now with NAI funding support.

Jet Propulsion Laboratory Team 2
[Note: Team name changed in 2003 to: Virtual Planetary Laboratory]
Team PI: Victoria Meadows
Proposal Title = Astronomical Detection of Biosignatures from Extrasolar Planets

Michigan State University
Team PI: Michael Thomashow
Proposal Title = Center for Genomic and Evolutionary Studies on Microbial Life at Low Temperature

University of Rhode Island
Team PI: Steven D'Hondt
Proposal Title = Subsurface Biospheres

University of Washington
Team PI: Peter Ward
Proposal Title = Habitable Planets and Evolution of Biological Complexity

Also in March, the Astromaterials Focus Group is approved.

The NAI General Meeting 2001 is held from April 10-12 at the Carnegie Institution of Washington in Washington, DC. More than 300 NAI member scientists attend for papers, posters, and focus group meetings. In late April, NASA Headquarters Special Assistant for Astrobiology, Carl Pilcher, is appointed Director of the Solar System Exploration Division, which includes astrobiology subject areas.


Carl Pilcher.
Image Credit: BBC News

NAI continues its support development of NAI Lead Team sites in order to achieve improved research team member contacts through use of information technology. This is accomplished with site visits and consultation with designated information technology (IT) administrators for each team location. An IT Working Group at NAI Central is formed to enhance this activity. Videoconferencing technical problems at team sites are resolved. Desktop videoconferencing tools are researched. The Polycom.SmartBoard system is now in use for all 15 NAI Lead Teams.

In July, the Astrobiology Task Force of the NASA Space Science Advisory Committee,
chaired by Charles Beichman, submits its final report to NASA Headquarters. Within this document (page 9-10), Beichman writes that the group was "impressed with the exciting science being carried out within astrobiology" and complemented NASA on "succeeding to bring together scientists from many disparate fields". The group noted the "high visibility of NAI, both among scientists and the public." It recommended that a follow-up review of the NAI be conducted by the NASA Chief Scientist and that NASA Headquarters should "pay careful attention" to the critical issue of NAI leadership.

Continuing his interaction with NAI, Michael Meyer is promoted to Astrobiology Senior Scientist at NASA Headquarters in July.

NAI begins plans in the summer to start a 'minority faculty fellowship program' for astrobiology research at host NAI Team locations. This NAI program would use additional funding support associated with NASA Headquarters' MUREP activities. MUREP (Minority University Research and Education Programs) uses a U.S. Department of Education list identifying minority institutions. NASA has policies, budget areas, and procedures to enhance involvement of these minority institutions in NASA's mission.

In November, NAI Central recognizes the increase in publication of books relating to astrobiology topics. Additions to its "Books on Astrobiology" list are posted on the NAI website for general background reading.

Throughout this year, NAI staff work on redesigns, enhancements, and updating projects for the NAI website. These changes

include: a Member Services section via password access, improved site navigation, pages for the four new Lead Teams and each of the Focus Groups, updated pages for the original eleven Lead Teams, plus increased emphasis on NAI research and more information on funding support.

With the NAI website redesign, the Education and Public Outreach section features include interactive student pages. A selected "Ask an Astrobiologist" archive of questions (asked by the general public and students) and answers (from NAI astrobiology staff and scientists) is also made available on the NAI website.

In December, the Groupement des Recherches en Exobiologie becomes an NAI Affiliate International Partner. This is the fourth international partner of NAI.

The NAI Annual Report, Year 3 (July 2000 - June 2001) is published and made available on the NAI website in December. Science project reports, related publications, plus education and public outreach activities are included in reports from each NAI Lead Team.

TOP

2002

In January, NAI completely discontinues use of the PostDoc website, which was developed by Ames Research Center as an information repository and communication exchange tool. Instead, access to NAI email lists and a document sharing tool for the NAI community are added to the Member Services section of the redesigned NAI website.

NAI begins broadcasting NAI member video seminars in January with the Director's Seminar Series, which are science talks by senior NAI member scientists. Another seminar series begins in February, the FAR (Forum for Astrobiology Research) Series, which are science talks by graduate students and postdocs. Both of these video seminars occur monthly and are archived on the NAI website.

The NAI Needs Assessment Report, "Communication and Collaboration in a Virtual Environment," which details the results of a Fall 2001 survey, is made available on the NAI website as an interactive document. Using a collaboration tool called PageSeeder, readers can review the document and add comments for members of the NAI community. Through this year, collaborative tools are researched, based on member-defined needs and requirements. Additional team information technology support people are funded at individual NAI team sites. WebEx (synchronous meeting tool) is launched for pilot use.

A video series archived on the NAI website begins in February. These videos are interviews of NAI scientists (Profiles) or cover particular astrobiology research questions (Featured Questions or Video Features).

Based on planning work begun last summer (see 2001 summer background description), NAI establishes its Minority Institution Faculty Sabbatical Program in March with additional funding support associated with NASA Headquarters' MUREP activities. The NAI program provides selected minority institution faculty members with funding for 8-10 weeks of collaborative astrobiology research at a host NAI Team location during the calendar year, travel to and from the host location, attendance at an astrobiology science meeting for the faculty member and two students from the minority institution. This program will be ongoing, with three faculty selected for the program in 2002.

The Astrobiology Science Conference 2002 is held at the Ames Research Center during April 8-11. This meeting is open to all scientists, and NAI members participate in significant numbers.

Throughout the year, there is increased interest in teaching introductory astrobiology courses for undergraduates, such as "Life in the Universe" or "Astrobiology 101." One survey indicates that more than 100 courses are being offered in these subject areas. NAI encourages its members to share this information with current and prospective instructors. The "Faculty Forum" subsection is posted on the NAI website in the "College Courses" main section.

September begins with the establishment of the European Exo/Astrobiology Network Association (EANA) as an International Affiliate Partner of NAI with a formal signature ceremony.

In October, Baruch S. Blumberg ends his tenure as Director of NAI. Rosalind Grymes (now NAI Deputy Director) is appointed NAI Director (Acting). The next Director of NAI, Bruce Runnegar of the University of California at Los Angeles, is expected to begin his tenure in 2003.


Rosalind Grymes.
Image Credit: NASA

The COEL (Committee on the Origins and Evolution of Life) submits its final edited report "Life in the Universe: An Assessment of U.S. and International Programs in Astrobiology" published for the Space Studies Board and Board on Life Sciences (both with the National Research Council of the National Academies of Science). Background concerning this report is described in the NAI History section for February 2001.

In November, The Australian Center for Astrobiology (ACA) changes from being an Affiliate International Partner to an Associate International Partner with NAI.

NAI announces two new Focus Groups in November: 1) Virus Focus Group and 2) Biological Consequences of Impacts Focus Group. The Titan Focus Group was formed earlier this year in February, becoming active in November with attention to the Cassini-Huygens space mission.


The Cassini-Huygens Spacecraft.
Image Credit: NASA/ESA

NAI releases its third Cooperative Agreement Notice (CAN Cycle-3) in December. This Notice solicits proposals for selection of NAI Lead Teams since the five-year funding for the original eleven NAI Lead Teams is scheduled to end in July of 2003. This process involves competitive, peer-reviewed evaluation of submitted proposals for NAI funding.

The NAI Anuual Report, Year 4 (July 2001 - June 2002) is published on the NAI website. Science project reports, related publications and astrobiology roadmap objectives, plus education and public outreach activities are included in reports from each NAI Lead Team.

TOP

2003

In January, the NAI WebEx pilot project begins. This is a pilot of software that allows synchronized desktop sharing of presentations, video, documents, browser, and real-time editing capabilities. Each team information technology lead person is trained to use WebEx and established as a WebEx administrator. Development in this area continues.

The NAI General Meeting 2003 is held at Arizona State University in Tempe, Arizona from February 10-12 with about 500 attendees. There are roughly 300 science talks and posters, as well as focus group meetings for both formed and proposed groups, subject primer sessions, EPO meetings, astrobiology curriculum discussions, and international partner sessions. At this meeting, NAI Central staff members present posters concerning: 1) analyzed content from the NAI Annual Report (field research expeditions, journal publications, NASA space mission involvement, and descriptive profiles of NAI membership); 2) NAI collaboration with minority institutions plus NAI's activities in education and public outreach; 3) NAI's website video archive; 4) content of astrobiology college courses; and 5) social and technical requirements for NAI as a successful virtual organization.

In March, the updated NAI website design now provides easier navigation and a more user-friendly appearance. The site continues to be refined throughout the year. Also in March, WebEx Meeting software is first used during the monthly NAI Executive Council meeting. This allows meeting participants to interact from their various locations via computer.

Beginning in April, NAI assists the University of Washington in broadcasting their University of Washington Astrobiology Seminar Series. Video broadcasts of these science talks use NAI's polycom system from their location at the University of Washington. The Forum for Astrobiology Research (FAR) Seminar Series (presentations by graduate students and postdocs) and the Director's Science Seminar Series (talks by NAI senior scientists) continue. Series videos are archived on the NAI website. WebEx meeting software is now used to enable synchronous slide advancement as the speakers talk plus interaction via personal computers.

Also in April, the "NAI Newsletter" is launched on the NAI website. It combines elements from a number of previous information features on the website, including: Upcoming Events, Announcements, and Special Features.

Collaboration among distributed NAI scientists continues to be facilitated by researching and funding equipment such as lab-to-lab videoconferencing, desktop videoconferencing, virtual seminars, and wireless tool options for use in remote fieldwork settings.

New NAI Insight Courses are announced, with two courses for astrobiology researchers available during the summer of 2003: "Introduction to Planetary Science" and "Introduction to the Microbial World." These five-day intensive courses provide education in areas outside of the participant's primary field of expertise. Material is appropriate for professionals active in the field of astrobiology, including both graduate students and postdocs. Attendance is not limited to NAI members.

NAI continues to provide selected minority institution faculty members with funding support for 8-10 weeks of collaborative astrobiology research at a host NAI Team location during the calendar year. The NAI Minority Institution Research Sabbatical Program (formerly the Minority Institution Faculty Sabbatical Program begun and described in 2002) is renamed to emphasize its research aspect. This NAI program has additional funding support via NASA Headquarters' MUREP activities (see 2001 summer background description).

Results of the CAN Cycle-3 (begun in December 2002) are announced at the end of June. Twelve new NAI Lead Teams are chosen (via a competitive, peer-review process) to receive 5-year funding grants beginning this November.

NAI announces the new Astronomy Focus Group in September. It has a 3-year operational timeline plan involving science projects and NASA missions to provide a strong astronomical component for astrobiology.

The newly-selected NAI Lead Teams (CAN Cycle-3) are listed below, each with its Team Principal Investigator (PI) and proposal title. In November, these 12 NAI Lead Teams replace the 11 original NAI Teams, which began their NAI funding program in July 1998. The newly-selected NAI Lead Teams join the 4 teams selected in March 2001 (with their 5-year funding cycle) to make a total of 16 NAI Lead Teams in the NAI research and education program.

Carnegie Institution of Washington
Team PI: Sean Solomon
Proposal Title = Astrobiological Pathways: From the Interstellar Medium, Through Planetary Systems, to the Emergence and Detection of Life

Indiana University, Bloomington
Team PI: Lisa Pratt
Proposal Title = Indiana-Princeton-Tennessee Astrobiology Institute (IPTAI): Detection of Biosustainable Energy and Nutrient Cycling in the Deep Subsurface of Earth and Mars

Marine Biological Laboratory (Woods Hole)
Team PI: Mitchell Sogin
Proposal Title = From Early Biospheric Metabolisms to the Evolution of Complex Systems

NASA Ames Research Center
Team PI: David Des Marais
Proposal Title = Linking Our Origins to Our Future

NASA Goddard Space Flight Center
Team PI: Michael Mumma
Proposal Title = Origin and Evolution of Organics in Planetary Systems

SETI Institute
Team PI: Christopher Chyba
Proposal Title = Planetary Biology, Evolution, and Intelligence

University of Arizona
Team PI: Neville Woolf
Proposal Title = An Astronomical Search for the Essential Ingredients for Life: Placing our Habitable System in Context

University of California at Berkeley
Team PI: Jillian Banfield
Proposal Title = BIOspheres of Mars: Ancient and Recent Studies

University of California at Los Angeles
Team PI: Edward Young
Proposal Title = From Stars to Genes: An Integrated Study of the Prospects for Life in the Cosmos

University of Colorado (Boulder)
Team PI: Bruce Jakosky
Proposal Title = University of Colorado Center for Astrobiology

University of Hawaii (Manoa)
Team PI: Karen Meech
Proposal Title = The Origin, History, and Distribution of Water and Its Relation to Life in the Universe

In September, NASA's Office of Space Science distributes the 2003 revision of the 1998 NASA Astrobiology Roadmap. Its astrobiology research goals and objectives provide multiple research and exploration pathways, indicating how they might be prioritized and
coordinated. Objectives stated within the Roadmap provide topics for NAI research focus. For NAI Annual Reports, each science project indicates its particular related Astrobiology Roadmap objectives. These data are charted in the NAI Annual Report Appendix sections within the Year 3, Year 4, and Year 5 reports. In the NAI Year 2 Annual Report, the related Roadmap objectives are listed in the left margin at the beginning of each project report. The NAI Year 1 Annual Report charts projects and Roadmap objectives within its Preface section. Year 4 is the last Annual Report using the 1998 NASA Astrobiology Roadmap objectives to describe its projects. The 2003 revision (early copy available) is used beginning with Year 5.

The NAI Anuual Report, Year 5 (July 2002-June 2003) is published on the NAI website in December. Science project reports, related publications and astrobiology roadmap objectives, plus education and public outreach activities are included in reports from each NAI Lead Team.

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